# *Code 33447 RESCUE 230 BIPHASIC DEFIBRILLATOR*

**GIMA S.p.A. – Via Monza, 102 – 20060 Gessate (MI) – Italia**
**ITALIA:** Tel. 02 953854.1 – Fax. 02 95381167
e-mail: gima@gimaitaly.com – www.gimaitaly.com
**EXPORT:** Tel. +39 02 953854209/221/225 – Fax. +39 02 95380056
e-mail: export@gimaitaly.com – www.gimaitaly.com

**RESCUE 230 ver**
**External Biphasic Defibrillator**
**With ECG monitoring**
**User manual**

## Safety instructions

**⚠WARNING**

### General

- **Assure yourself prior and after the use of the RESCUE 230 that the unit is in safe and usable condition (cables integrity, battery status).**
- **RESCUE 230 is not intended for use in areas of highly inflammable anesthetics or other inflammable substances, especially in oxigenous areas.**
- **RESCUE 230 does not have to be put or used nearby a nuclear spin tomography plant, which is turned on.**

**⚠WARNING**

### Defibrillator

- **Defibrillation must be performed only by responsible trained doctors.**
- **Be sure that both surfaces of the shock paddles are completely moistened with gel.**
- **The shock paddles must be held at distance from other electrodes and any metal parts in contact with the patient.**
- **The patient must not be touched during defibrillation.**
- **Be sure that the parts of the patient body, such as the head or limbs are not in touch with metal parts, bed frames or stretchers, in order to prevent accidentally creating current path for the defibrillation impulse.**
- **During defibrillation with connected ECG cable ensure that all binding clips are connected with the patient.**
- **When defibrillating children do not exceed 50J.**
- **The shock paddles including handles should always be cleaned thoroughly after use.**

# INTRODUCTION

Thank you for choosing the RESCUE 230. Please read this Operator's Manual carefully and thoroughly before using the RESCUE 230. This Manual contains instructions on how to operate and maintain the RESCUE 230.

It is very important that you fully understand all the necessary instructions discussed in this manual so as to act quickly in an emergency.

Rescue 230 complies with international standards (93/42/EEC). This ensures high quality and reliability. In this regard:

Only persons authorized by GIMA S.p.A. should do all servicing of the device. There are no user serviceable parts in this device.
You should operate this device in accordance with the instructions specified in this manual.

This device has to be operated by personnel who have undergone training in Advanced Cardiac Life Support. In this mode, the operator must know how to interpret ECGs.

To ensure safety and reliability, use only parts and accessories recommended by GIMA S.p.A.

If you intend to use this device in conjunction with other devices not specified in this manual, please notify the manufacturer.

# WARRANTY

- This device is designed and manufactured according to European standards ( 93/42/EEC). Every defibrillator that goes out of the assembly line passes through a full reliability tests. In case of problems, our maintenance and exchange policies are in accordance with the relevant consumer protection laws and regulations in the particular country where the device is sold.

- The warranty period of this device is within one year after the date of purchase.

- When the device malfunctions during the warranty period (RESCUE 230 subjected to operating conditions within the specified limits), it will be repaired free of charge at our service centers.

- When you submit the device for maintenance, please specify the details as listed below : The name of model, product serial number, date of purchase, name of sales representative, information of customer and a brief description of the problems.

| | | | |
|---|---|---|---|
| Name of Product | Manual Biphasic Defibrillator | | |
| Model | RESCUE 230 | Serial No. | |
| Date of Purchase | | Sales Representative | |
| Customer Information | Address | | |
| | Name | | |
| | Contact No. | | |
| Brief Description of Problems | | | |

## Service

Only GIMA S.p.A. or its authorized representatives should service the device. If unauthorized personnel service the device during the warranty period, the warranty will become null and void.

GIMA S.p.A. or its authorized representatives are obliged to service the device free of charge during the warranty period.

When the device is not functioning properly, it has to be submitted for maintenance immediately.

When any abnormalities are found in the device or when a danger to bodily harm exists, the device has to be repaired fast and adequately by authorized personnel.

When the need for maintenance arises:

- Please contact GIMA S.p.A. or its authorized representatives immediately. Prepare a summary of the problems. Also include the name of model, product serial number, date of purchase, name of sales representative, Customer. information

There are no user-serviceable parts in the RESCUE 230. The user should not attempt any repair beyond what we recommend in the maintenance section of this manual.

## How to Use This Manual

### Contents of This Manual

- This Operator's Manual contains all the information a user needs to operate the RESCUE 230 properly.
- In case you have any problems regarding the operation of the device, please don't hesitate to contact the manufacturer.

### Safety Messages

The following safety messages are used to emphasize the safety practices that must be observed and followed during the operation of the RESCUE 230. The operator must follow the instructions in all the Danger, Warning, Caution, and Notice messages found throughout this Operator's Manual

In the event that the device is damaged due to misuse or negligence by a user, the manufacturer or the authorized representatives shall not be responsible for the damage or loss to the product.

**DANGER**
**Immediate hazards that will result in personal injury or death.**

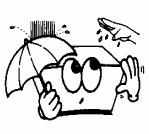
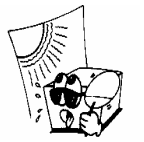
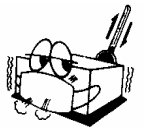
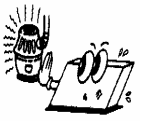
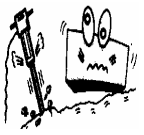
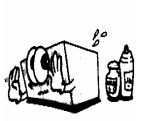
**WARNING**
**Conditions, hazards, or unsafe practices that can result in serious personal injury or death.**

**CAUTION**
**Conditions, hazards, or unsafe practices that can result in minor personal injury, damage to the RESCUE 230, or loss of data stored in the device.**

**NOTICE**
**Used to denote items that are important during installation, operation, or maintenance of the device.**

# Device Operation Guidelines

### General Guidelines

| | |
|---|---|
|  | Do not operate or store the device in conditions that are beyond the following specified limits.<br>Operating Conditions<br>Temperature 0 °C to 50 °C<br>Humidity 5 % to 95 % (non-condensing)<br>Storage Conditions<br>Temperature -20 °C to 70 °C<br>Humidity 5 % to 95 % (non-condensing) |
|  | Do not store the device in areas that are directly exposed to sunlight |
|  | Do not store the device in areas with highly fluctuating temperatures |
|  | Do not store the device near heating equipment |
|  | Do not store the device in areas where there is high vibration (in excess of Category 10 of MIL-STD-810E) |
|  | Do not operate or store the device in environments with high concentration of flammable gas or anesthetics. |
| | Do not operate or store the device in areas with high concentration of dust |
| | Only personnel authorized by the manufacturer shall open the device for servicing. There are no user serviceable components inside the device. |

# Storage and Operating Environment Guidelines

- Avoid damp locations. Do not operate and store the device beyond the specified limits. Do not operate the device with wet hands.
- Do not expose the device to direct sunlight during storage.
- Do not store the device in areas with highly fluctuating temperatures.
- Do not store the device close to heating equipment and appliances.
- Do not store the device near sources of vibration.
- Do not store and operate the device in locations that are exposed to chemicals, explosive gas and solvents.
- Keep the device away from dusty environments.
- There are no user serviceable parts inside the RESCUE 230. Only authorized service personnel should open the device for repairs.
- During recharging, when the device is connected and disconnected from the mains power connector, hold the plug and not the electrical cord.

**Operating environmental condition limits:**
- **Temperature: 0 °C to 50 °C**
- **Relative Humidity: 5 % to 95 % (non-condensing)**

**Storage environmental condition limits:**
- **Temperature: -20 °C to 70 °C**
- **Relative Humidity: 5 % to 95 % (non-condensing)**

**DANGER**
**Do not use the RESCUE 230 if it has been submerged in water. Call immediately for service assistance.**

**Electrical Safety Guidelines**

- Use the only the original power supply during recharging. See the section Chapter on Power Supplies for more details.
- During recharging, do not place the device where the environmental conditions exceed the storage conditions specified in the Storage and Operating Environment Guidelines

**WARNING**
**During operation, the device should be placed away from sources of electromagnetic interference such as motors, generators, X-Ray equipment, radio transmitters, cellular mobile telephones and others, as these might interfere with the signals being acquired.**

**NOTICE**
**The RESCUE 230 is classified as follows:**
**- It is a Class II, BF equipment in terms of electrical shock prevention (EN 60601-1). It is not proper to operate this device around combustible anesthetic or solvents.**
**- For the ECG patient cable is a Class II, CF (EN60601-1).**
**- The Electromagnetic emission level is Class B according to EN 60601-1 (Safety of Electric Medical Equipment), and the noise redemption is B level according to the EN 60601-1-2**

## Cleaning and Maintenance

After each use, clean the RESCUE 230 using a soft, damp cloth moistened with any of the following solvents:

Soap and water
70% solution isopropyl alcohol
Chlorine bleach and water mixture (30 ml bleach/liter of water)
Ammonia-based cleaners
Hydrogen peroxide

**⚠CAUTION**

**Do not immerse any part of the RESCUE 230 in fluids.**
**Do not let any fluid enter the case of the device.**
**Do not spill liquids on the case of the device.**
**Do not use strong, acetone-based cleaners in cleaning the device.**
**Do not use abrasive materials in cleaning the unit, especially on the LCD display.**
**Do not sterilize the RESCUE 230**.

Although there are no user serviceable parts inside the RESCUE 230, the operator can do maintenance checks that will help ensure that the device stays in mint condition.

- Check the case of the device for any apparent damage.
- Check the ports (defibrillator lead port, adapter power port) to see that they are tightly in place.
- Check the accessories, especially the defibrillation pads, to see that they are in good condition and for the disposable pads, that they have not yet reached their expiration dates.
- Check the battery status and if it under 75%, please connect the AC charger.

## Product Description

The **RESCUE 230** is a manual external defibrillator and ECG Monitoring. It is a battery powered, lightweight and portable device designed to deliver defibrillation shocks during rescue operations.

The user has to do the analysis of the ECG of the patient and set the energy of the shock to be delivered. The choices are 10, 20, 30, 50, 100, 150, 200 and 230 (all in Joules). The energy value can be fine tuned from 3 to 10J in steps of 1J and from 10 to 230J in steps of 5J.

Synchronized cardioversion can also be done. During synchronized cardioversion, the defibrillating shock is delivered within 40 milliseconds of the occurrence of a QRS peak.

The RESCUE 230 may also be used to do ECG monitoring. ECG monitoring only is done by connecting the custom designed, 4 leads ECG monitoring cable assembly from GIMA S.p.A.
In this case RESCUE 230 will display/print 3+3 traces ( I,II,III – aVR,aVL,aVF).

The RESCUE 230 may be equipped with disposable defibrillation pads. Through these pads, the electrical signal from the patient's heart is acquired. The defibrillation shock is delivered also through the same defibrillation pads

**⚠ CAUTION**

**The RESCUE 230 is NOT intended for pediatric use. It may be used in children over the age of 8 years (weighing 25kg or above).**
**In any case, the decision to defibrillate is of the operating doctor.**

**NOTICE**

**Do not remove or change the internal battery pack. If it is necessary to have it changed, contact the manufacturer or its authorized representatives.**

# Intended Purposes

**Indications**

Asynchronous defibrillation – the shock delivery is not synchronized with the QRS peak
In asynchronous defibrillation, the RESCUE 230 is indicated for use on patients with the following symptoms

**a) Unconsciousness**
**b) Absence of normal breathing and**
**c) Lack of detectable pulse.**

Synchronous defibrillation – the shock delivery is synchronized with the QRS peak of the patient's ECG.

**In synchronous defibrillation, the RESCUE 230 is indicated for use on patients with ECGs that show the presence of Atrial Fibrillation**:

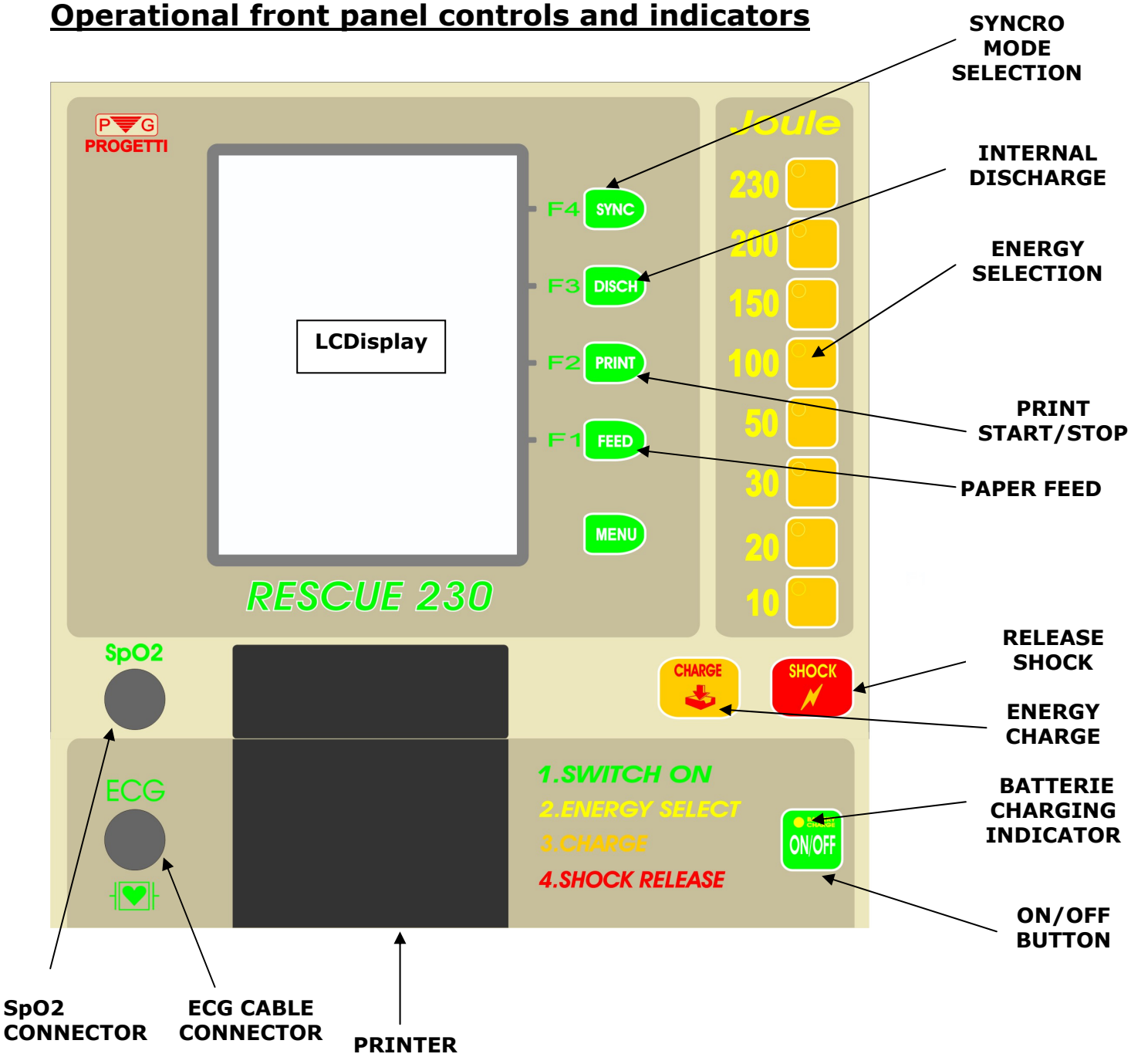
**Contraindications**

The RESCUE 230 should not be used on patients that:
**a) Are conscious**
**b) Are breathing normally**
**c) Have detectable pulse.**

**Intended Users**

The RESCUE 230 is intended for use by health care professionals and emergency rescue personnel who have been trained in advanced cardiac life support. The user must know how to interpret ECGs.

## Operational front panel controls and indicators



# FRONT PANEL CONTROL FUNCTIONS KEYS

| | |
|---|---|
| **Key ON/OFF** | Power On-off push button of RESCUE 230<br>At switch on, if the padles are disconnected, the battery status and clock set-up screen will appear . To set-up the clock use F1-F3 keys else to start ECG monitoring press F1 key.<br>To shut-off the device press the ON/OFF key only once. |
| **Key SHOCK** | When the red light inside this key is on it means that RESCUE230 is ready to defibrillate. Pressing this key will release the defibrillation shock.<br>(This key is active only when disposable pads are used).<br>To release the shock with the standard pads press both pushbuttons on the pads handles. |
| **Key CHARGE** | This key will start the energy charging to the selected level. It is active only with the disposable pads.<br>To start the charging with the standard pads press both pushbuttons on the pads handles. |
| **Key MENU** | Controls the device set-up functions.<br>When pressed, on the display will appear the specific functions for the F1-F4 keys. |
| **Key SYNC** | Used for the sync mode (defibrillation will be done in sync with the R-wave of the ECG complex).<br>The sync mode is displayed on the screen. |
| **Key DISCH** | Pressing this key will discharge the energy internally.<br>(If no discharge is actuated, after 30 sec the RESCUE 230 will discharge internally the energy). |
| **ENERGY selection keys** | Used to select the energy level desired. The corresponding light will switch on and the energy value will be displayed on the screen.(set value). |
| **Key PRINT** | Enables to obtain a hardcopy of the ECG traces and the device set-up values. |
| **Key FEED** | Paper feed key. |

## Keys F1-F4 secondary functions

Pressing the MENUE key on the screen the secondary functions of F1-F4 will be displayed.
The functions are described on the following table:

| | BASIC FUNCTION | MENU 1 | MENU 2 |
|---|---|---|---|
| **F4** | **DSCH –i**nternal discharge | Change the ECG traces displayed/printed: **I,II,III** or **aVR,aVL,aVF** | Enable/disable the **NOTCH** filter (line noise) |
| **F3** | **SYNC –** set sync mode | Set the scan velocity: 5mm/s,12.5mm/s or 25mm/s | Enable/disable the **LP** filter (muscular tremors) |
| **F2** | **PRINT** – start/stop printing | Set the ECG trace gain: 5mm/mV,10mm/mV or 20mm/mV | |
| **F1** | **FEED –** paper feed | Enable/disable the **HP** filter (base line stability) | **SAVE** the device set-up parameters. |

## Light indicators

| | |
|---|---|
| **BATTERY Charging Light** (on the ON/OFF key) | Indicates that the AC power supply is connected and the batteries are charging. When the charge is finished this light will switch off. When RESCUE 230 is switched on, the light may be on even if the batteries are fully charged (the device is in backup mode, using the batteries and the AC supply) |
| **ENERGY Selection Light** (on the energy selection keys) | The light indicates the energy level selected . |
| **DEFIBRILLATION ENERGY READY** (on the shock Key) | Indicates that the energy selected was charged and the device is ready for defibrillation. |

## Display Messages guide

| | |
|---|---|
| **CHECK PADS** | The defibrillation pads are disconnected. |
| **IMPEDANCE** | Indicates the impedance out of range (min 20 ohm, max 200 ohm). Verify the pads contact with the patient chest and add more conductive gel. |
| **ARMING** | RESCUE 230 is charging the capacitor to the energy level selected. |
| **READY** | Indicates that the capacitor is charged and the device is ready for defibrillation. In Sync mode the shock will be released only when a valid ECG wave R peak is detected. In this mode make sure a valid ECG trace is available on the display. |
| **BAT OK/LOW** | Indicates the battery status. If **LOW** then please connect the AC power supply. |

## Display organization

When the 4 leads ECG patient cable is disconnected, the display will show only one ECG trace (II) input from the defibrillation pads.
Connecting the 4 leads ECG patient cable the display will show 3+3 ECG traces: I,II,III or aVR,aVL,aVF based on the user selection (see menu functions).

Please make sure to connect all ECG patient cable terminals to the patient limbs before proceeding with the defibrillation.

Using the SpO2 sensor option, the display will show only 2 ECG traces (patient cable connected) and the SpO2 wave. The So2 and the heart rate will be displayed on the bottom left side of the display. The heart rate on the top of the screen is related only to the ECG signals.

The display also indicates the selected energy level, the filters status, the gain and velocity of the ECG wave as well as the battery status and the clock (date and time).

**DEFIBRILLATION PADS CONNECTORS**

**AC POWER SUPPLY CONNECTOR**

## Input Connectors

| | |
|---|---|
| **Defibrillation Pads input** (left side down) | Used for the defibrillation pads. For the disposable pads please order also the adapting cable. |
| **SpO2 input** (front panel) | Used for the SpO2 sensor (optional). The **RESCUE230** will automatically recognize the sensor and will modify accordingly the display. |
| **ECG patient cable input** (front panel) | Input for the ECG 4 leads patient cable. The **RESCUE230** will automatically recognize the cable and will modify the accordingly the display. |
| **Battery charger AC power supply** (right side down) | Battery charger and AC power supply input. **USE ONLY THE ORIGINAL AC POWER SUPPLY.** |

## Device Preparation

**Unpacking**

1) Carefully inspect the packing container and the device for any damage that might have been sustained during shipping.
2) Check the shipping list to ensure that the unit comes with the complete accessories.

**⚠ CAUTION**

**It is important to have all the necessary accessories all the time. Make sure that you have the complete accessories during unpacking.**

## Defibrillation pads connectors plug-in

Push the connector (STERNUM-APEX) up to the end and turn it right until it locks.
To unplug the connectors, pull the connector lever and turn it left up to the stop and then pull it out.

**PADS CONNECTUORS INSERTION**

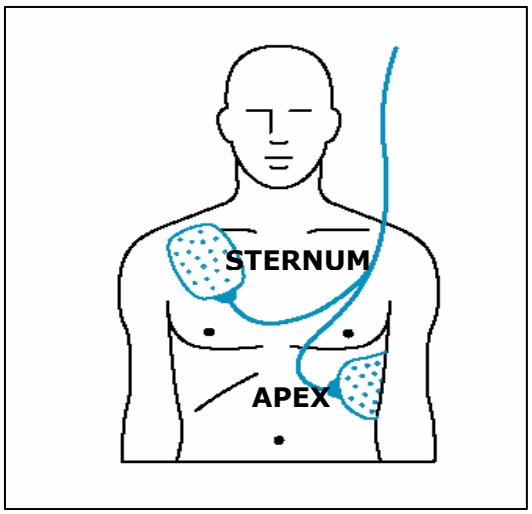
## Patient Preparation

Evaluate the condition of the patient. The patient must exhibit the symptoms for which the defibrillation is indicated. These symptoms are:

**Unconsciousness**
**Absence of normal breathing and**
**Lack of detectable pulse.**

If the patient is exhibiting the said symptoms, do the following:

- Remove clothing from the patient's chest. Wipe moisture and clip or shave excessive chest hair.
- If using the standards pads, make sure to use on each one enough conductive gel.
- If using disposable pads, peel off their protective sheets. Attach the pads to the patient. The sticky side must be in contact with the patient's skin. Place the pads in accordance with the graphic guide at the back of the pads. The placement is also shown in the figure below




## Defibrillation procedure

**1.** Switch on the device using the **ON/OFF** push button. By default the energy is set to **150 J.** The ECG trace and the heart rate will be displayed .

**2.** Select the energy level required.

**3.** If you are using the standard pads, press both push buttons on the handles to start charging to the selected energy.
If you are using disposable pads press the **CHARGE** push button to start charging.
The **ARMING** message will be displayed and the charging sound will start.
When the charge ends the **READY** message will be displayed and on the **SHOCK** key the red light will go on. This means that the RESCUE 230 is ready for defibrillation.

**4.** To release the defibrillation shock, press both push buttons on the standard pads or press the **SHOCK** key if using disposable pads. The RESCUE 230 will discharge internally after a 30 sec wait time.
If the defibrillation is not required, press the **DSCH (F4)** key to discharge internally.

**⚠CAUTION**
If the **IMPEDANCE** message is displayed then add more gel on the pads or press harder the pads on the patient chest. The RESCUE 230 will not release the shock if the impedance is out of range.
In the **sync** mode the shock will not be released unless the ECG wave is valid.

**⚠CAUTION**
Make sure that all electronic devices which may disturb the ECG trace must be placed at a safe distance from RESCUE 230 before defibrillation.

**⚠CAUTION**
Please make sure nobody touches the patient during the defibrillation.

**⚠CAUTION**
The RESCUE 230 is not intended for pediatric use. It should not be used on patients with an age inferior of 8 years or with a body weight less than 25 Kg.

# PRINTING AND PAPER CHANGE

To start the printing press the **PRINT** (F2) key. The hardcopy will start with the set-up parameters and with the ECG trace. The hardcopy will keep the display set-up (velocity, gain and number of traces )
To stop the printing please press again the **PRINT** (F2) key.

When the paper is finished the '**PAPER**' message will be displayed.
To replace the paper, open the printer cover (see the image below), insert a new paper roll with the thermosensible side up and then close the cover. Push the **FEED** key until the paper comes out straight.

**Opening the printer cover**

## Battery charge

When the '**BAT LOW**' message is displayed please connect the AC charger.
The battery charge light should go on. When the batteries are fully charged the light will go off.
To see the battery charge status, switch on the RESCUE 230 with at least one pad disconnected.
The battery charge status will be displayed. If it shows less than 75% than please connect the AC charger.

> **⚠ CAUTION**
>
> **Please use only the original charger.**
> **Do not leave the AC charger connected more than 5 hours. If after this time the charging light does not go off, please contact the service center.**

## Date/Time setup

To set-up the real time clock, switch on the **RESCUE 230** with at least one pad disconnected.
On the screen will be displayed the battery status, the date and time.

The **F4** key enables the clock set-up. With the **F3** key choose the value to change and with the **F2** key you can modify the value.

To exit the clock set-up press again the **F4** key.
Pressing the **F1** key the ECG monitoring will start.

**TECHNICAL DATA**

## ECG Monitoring

- **Patient connection :**
  Defibrillation pads or 4 leads ECG patient cable
- **Bandwith:**
  0.5 to 140 Hz (-3 dB) with filters off
- **ECG trace parameters:**
  Velocity : 5,12.5,25mm/sec
  Gain: 5,10,20 mm/mV
  Traces: 3+3 (I,II,III – aVR,aVF,aVL) with 4 leads patient cable
- **Heart rate:**
  Digital readout on the display from 20 a 300 bpm (± 2%)

## Defibrillator

- **Operation mode:**
  Manuale
- **Wave type:**
  Biphasic (Truncated exponential) with impedance compensation
- **Energy:**
  Levels: 10,20, 30, 50,100, 150, 200, 230 J
  Fine levels: from 3 J to 10J in steps of 1 J and from 10 J to 230J steps of 5 J
- **Defibrillatable impedance :**
  da 20ohm a 200ohm
- **Energy charging time:**
  Less than 7 sec (with batteries fully charged)
- **Syncro Mode or normal mode**
- **Defibrillation pads:** Standard or disposable

## Display/ Printer

- High resolution LCDisplay
- LCD Dimensions: 5.7 inches diagonale, 320X240 pixels
- Thermal printer 200dpi on 58mm paper

## Device Dimensions

- Dimensions: 340 mm X 260 mm X 130 mm (L X W X H)
- Weight 5.5 kg including pads and AC charger

## AC charger power supply

- Input: 100 ~ 240V AC 50/60Hz max. 1A
- Output: 12V DC, 2.5A

## Battery pack

- 12V battery Ni-Cd (internal rechargeable)
- charging time 3 to 4 hours
- capacity : 100 shocks (battery fully charged)

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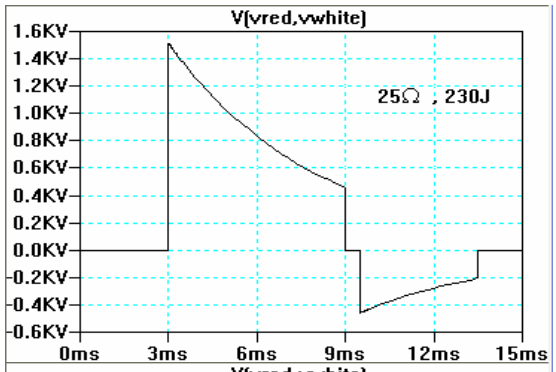
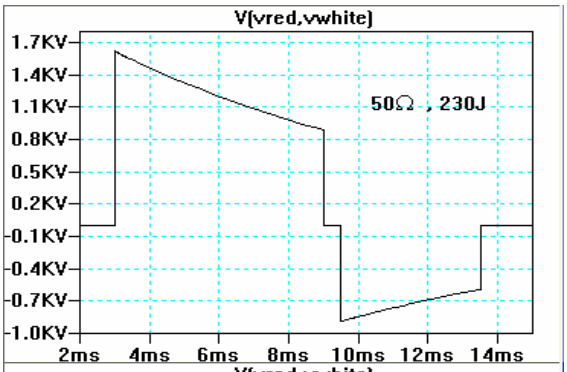
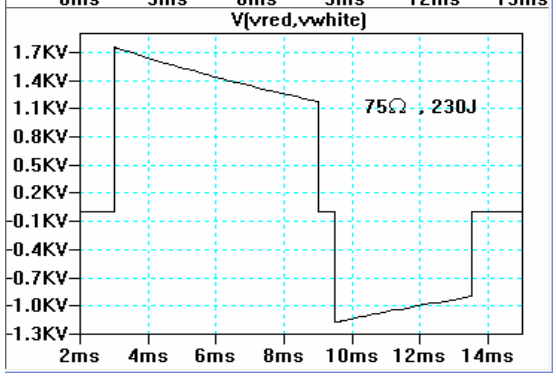
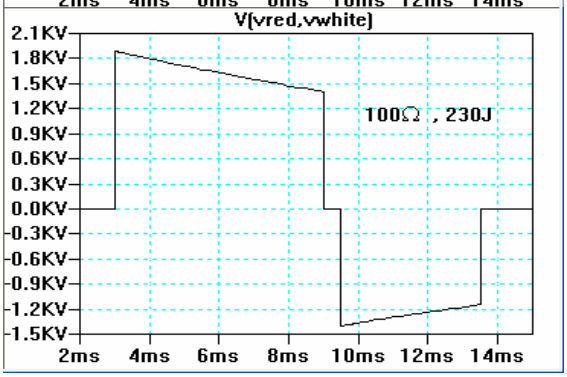
## Biphasic waveforms

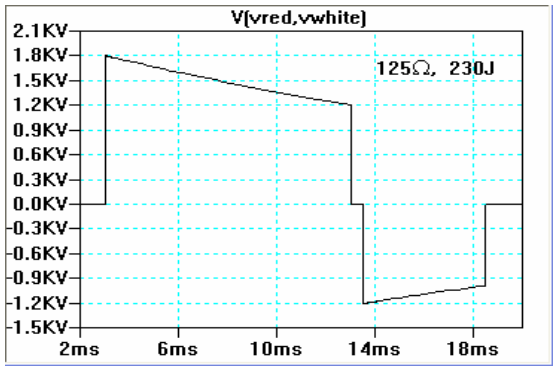
The following waveforms are the RESCUE 230 output for a maximum of 230 Joule:

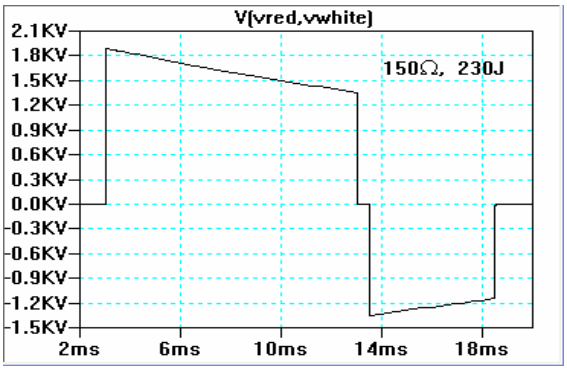


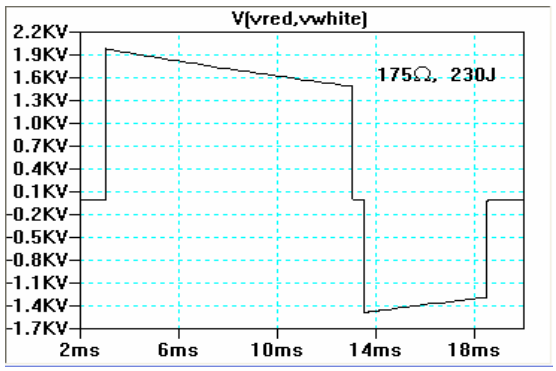



TABEL 201

| Guida e dichiarazione del costruttore – emissioni elettromagnetiche<br>**Guidance and manufacturer's declaration – electromagnetic emissions** | | |
|---|---|---|
| L'apparecchio Rescue 230 è previsto per funzionare nell'ambiente elettromagnetico sotto specificato. Il cliente o l'utilizzatore dell'apparecchio Rescue 230 dovrebbe assicurarsi che esso venga usato in tale ambiente.<br>*The equipment Rescue 230 is intended for use in the electromagnetic environment specified below. The customer or the user of Rescue 230 should assure that it is used in such an environment.* | | |
| Prova di emissione<br>Emissions test | Conformità<br>Compliance | Ambiente elettromagnetico – guida<br>Electromagnetic environment - guidance |
| Emissioni RF<br>RF emissions<br>CISPR 11 | Gruppo 1<br>Group 1 | L'apparecchio Rescue 230 utilizza energia RF solo per il suo funzionamento interno. Perciò le sue emissioni RF sono molto basse e verosimilmente non causano nessuna interferenza negli apparecchi elettronici vicini.<br>*The equipment Rescue 230 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.* |
| Emissioni RF<br>RF emissions<br>CISPR 11 | Classe B<br>Class B | L'apparecchio Rescue 230 è adatto per l'uso in tutti i locali compresi quelli domestici e quelli collegati direttamente ad un'alimentazione di rete pubblica a bassa tensione che alimenta edifici usati per scopi domestici.<br>*The equipment Rescue 230 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.* |
| Emissioni armoniche<br>Harmonic emissions<br>IEC 61000-3-2 | Classe A<br>Class A | |
| Emissioni di fluttuazioni di tensione/flicker<br>Voltage fluctuations/ flicker emissions<br>IEC 61000-3-3 | Conforme<br>Complies | |

TABEL 202

| Guida e dichiarazione del costruttore – immunità elettromagnetica<br>**Guidance and manufacturer's declaration – electromagnetic immunity** | | | |
|---|---|---|---|
| L'apparecchio Rescue 230 è previsto per funzionare nell'ambiente elettromagnetico sotto specificato. Il cliente o l'utilizzatore dell'apparecchio Rescue 230 deve garantire che esso venga usato in tale ambiente.<br>*The equipment Rescue 230 is intended for use in the electromagnetic environment specified below. The customer or the user of Rescue 230 should assure that it is used in such an environment.* | | | |
| Prova di immunità<br>Immunity test | Livello di prova<br>***test level***<br>*IEC 60601* | Livello di conformità<br>compliance level | Ambiente elettromagnetico – guida<br>Electromagnetic environment - guidance |
| Scarica elettrostatica (ESD)<br>Electrostatic discharge<br>*(ESD)*<br><br>IEC 61000-4-2 | ***±6 kV a contatto***_contact<br>±8 kV in aria_*air* | ***±6 kV a contatto***_contact<br>±8 kV in aria_*air* | ***I pavimenti devono essere in legno, calcestruzzo o in ceramica. Se i pavimenti sono ricoperti di materiale sintetico, l'umidità relativa dovrebbe essere almeno 30 %.***<br>*Floors should be wood, concrete or ceramic tile. If foors are covered with sntetic material, the relative humidity should be at least 30 %.* |
| Transitori/treni elettrici veloci<br>Electrical fast transient/burst<br><br>IEC 61000-4-4 | ***±2 kV per le linee di aliment. di potenza***_for power supply lines<br>±1 kV per le linee di ingresso/uscita_*for input/output lines* | ***±2 kV per le linee di aliment. di potenza***_for power supply lines<br>***±1 kV per le linee di ingresso/uscita_for input/output lines*** | ***La qualità della tensione di rete dovrebbe essere quella di un tipico ambiente commerciale o ospedaliero***<br>*Mains power quality should be that of a typical commercial or hospital environment.* |
| Sovratensioni<br>Surge<br><br>IEC 61000-4-5 | ***±1 kV modo differenziale***<br>_differential mode<br>±2 kV modo comune _*common mode* | ***±1 kV modo differenziale***<br>_differential mode<br>***±2 kV modo comune _common mode*** | ***La qualità della tensione di rete dovrebbe essere quella di un tipico ambiente commerciale o ospedaliero***<br>*Mains power quality should be that of a typical commercial or hospital environment.* |

| | | | |
|---|---|---|---|
| Buchi di tensione, brevi interruzioni e variazioni di tensione sulle linee di ingresso dell'alimentazione<br>Voltage dips, short interruptions and voltage variations on power supply input lines<br><br>IEC 61000-4-11 | <5 % $U_T$<br>(>95 % buco in_*dip in* $U_T$ )<br>per_*for* 0,5 cicli_*cycle*<br><br>40 % $U_T$<br>(60 % buco in_*dip in* $U_T$ )<br>per_*for* 5 cicli_*cycle*<br><br>70 % $U_T$<br>(30 % buco in_*dip in* $U_T$ )<br>per_*for* 25 cicli_*cycle*<br><br><5 % $U_T$<br>(>95 % buco in_*dip in* $U_T$ )<br>per_*for* 5 sec | <5 % $U_T$<br>(>95 % buco in_*dip in* $U_T$ )<br>per_*for* 0,5 cicli_*cycle*<br><br>40 % $U_T$<br>(60 % buco in_*dip in* $U_T$ )<br>per_*for* 5 cicli_*cycle*<br><br>70 % $U_T$<br>(30 % buco in_*dip in* $U_T$ )<br>per_*for* 25 cicli_*cycle*<br><br><5 % $U_T$<br>(>95 % buco in_*dip in* $U_T$ )<br>per_*for* 5 sec | *La qualità della tensione di rete dovrebbe essere quella di un tipico ambiente commerciale o ospedaliero. Se l'utilizzatore di Rescue 230 richiede un funzionamento continuato anche durante l'interruzione della tensione di rete, si raccomanda di alimentare Rescue 230 con un gruppo di continuità (UPS) o con batterie.*<br>*Mains power quality should be that of a typical commercial or hospital environment. If the user of the Rescue 230 requires continued operation during power mains interruptions, it is recommended that the Rescue 230 be powered from uninterruptible power supply or a battery.* |
| Campo magnetico a frequenza di rete (50/60 Hz)<br>Power frequency (50/60 Hz) magnetic field<br><br>IEC 61000-4-8 | *3 A/m* | *3 A/m* | *I campi magnetici a frequenza di rete dovrebbero avere livelli caratteristici di una località tipica in ambiente commerciale o ospedaliero.*<br>*Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.* |
| Nota_e $U_T$ è la tensione di rete in c.a. prima dell'applicazione del livello di prova.<br>$U_T$ is the a.c. mains voltage prior to application of the test level. | | | |

TABEL 203

Guida e dichiarazione del costruttore – immunità elettromagnetica

## Guidance and manufacturer's declaration – electromagnetic immunity

L'apparecchio Rescue 230 è previsto per funzionare nell'ambiente elettromagnetico sotto specificato. Il cliente o l'utilizzatore di questo apparecchio deve garantire che esso venga usato in tale ambiente.

*The equipment Rescue 230 is intended for use in the electromagnetic environment specified below. The customer or the user of this equipment should assure that it is used in such an environment.*

| Prova di immunità<br>Immunity test | Livello di prova<br>***test level***<br>*IEC 60601* | Livello di conformità<br>compliance level | Ambiente elettromagnetico – guida<br>Electromagnetic environment - guidance |
|---|---|---|---|
| RF condotta<br><br>IEC 61000-4-6 | *3 Veff*<br><br>*da 150 kHz a 80 MHz* | *3 Veff* | *Gli apparecchi di comunicazione a RF portatili e mobili non dovrebbero essere usati più vicino a nessuna parte dell'apparecchio Rescue 230 compresi i cavi, della distanza di separazione raccomandata calcolata con l'equazione applicabile alla frequenza del trasmettitore.*<br><br>***Distanza di separazione raccomandata***<br><br>$d = 1{,}2\sqrt{P}$ |
| RF irradiata<br><br>IEC 61000-4-3 | *3 V/m*<br><br>da 80 MHz a 2,5 GHz | 3 V/m | $d = 1{,}2\sqrt{P}$ da 80 MHz a 800 MHz<br><br>$d = 2{,}3\sqrt{P}$ *da 800 MHz a 2,5 GHz*<br><br>*ove P è la potenza massima nominale d'uscita del trasmettitore in Watt (W) secondo il costruttore del trasmettitore e* d *è la distanza di separazione raccomandata in metri (m).*<br>L'intensità di campo dei trasmettitori a RF fissi, come determinato da un'indagine elettromagnetica[a] del sito potrebbe essere minore del livello di conformità in ciascun intervallo di frequenza[b].<br>Si può verificare interferenza in prossimità di apparecchi contrassegnati dal seguente simbolo:<br><br> |

Note_s:

(1) A 80 MHz e 800 MHz, si applica l'intervallo della frequenza più alto.

(2) Queste linee guida potrebbero non applicarsi in tutte le situazioni. La propagazione elettromagnetica è influenzata dall'assorbimento e dalla riflessione di strutture, oggetti e persone.

a Le intensità di campo per trasmettitori fissi come le stazioni base per radiotelefoni (cellulari e cordless) e radiomobili terrestri, apparecchi di radioamatori, trasmettitori radio in AM e FM e trasmettitori TV non possono essere previste teoreticamente e con precisione. Per valutare un ambiente elettromagnetico causato da trasmettitori fissi RF fissi, si dovrebbe considerare un'indagine elettromagnetica del sito. Se l'intensità di campo misurata nel luogo in cui si usa l'apparecchio Rescue 230, supera il livello di conformità applicabile di cui sopra, si dovrebbe porre sotto osservazione il funzionamento normale dell'apparecchio Rescue 230. Se si notano prestazioni anormali, possono essere necessarie misure aggiuntive come un diverso orientamento o posizione dell'apparecchio Rescue 230.

b L'intensità di campo nell'intervallo di frequenze da 150 kHz a 80 MHz dovrebbe essere minore di 3 V/m.

TABEL 204

Distanze di separazione raccomandate tra apparecchi di radiocomunicazione portatili e mobili e gli apparecchi Rescue 230

## Recommended separation distances between portable and mobile RF communications equipment and the equipment Rescue 230

L'apparecchio Rescue 230 è previsto per funzionare in un ambiente elettromagnetico in cui sono sotto controllo i disturbi irradiati RF. Il cliente o l'utilizzatore dell'apparecchio Rescue 230 possono contribuire a prevenire interferenze elettromagnetiche assicurando una distanza minima fra gli apparecchi di comunicazione mobili e portatili a RF (trasmettitori) e l'apparecchio Rescue 230 come sotto raccomandato, in relazione alla potenza di uscita massima degli apparecchi di radiocomunicazione.

*The equipment Rescue 230 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the equipment Rescue 230 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the equipment Rescue 230 as recommended below, according to the maximum output power of the communications equipment.*

| Potenza di uscita massima del trasmettitore specificata<br>Rated maximum output power of transmitter<br>**W** | Distanza di separazione alla frequenza del trasmettitore<br>***Separation distance according to frequency of transmitter***<br>(m) | | |
|---|---|---|---|
| | ***da 150 kHz a_to 80 MHz***<br>$d = 1{,}2\sqrt{P}$ | ***da 80 MHz a_to 800 MHz***<br>$d = 1{,}2\sqrt{P}$ | *da 800 MHz a_to 2,5 GHz*<br>$d = 2{,}3\sqrt{P}$ |
| 0,01 | 0,12 | 0,12 | 0,23 |
| 0,1 | 0,38 | 0,38 | 0,73 |
| 1 | 1,2 | 1,2 | 2,3 |
| 10 | 3,8 | 3,8 | 7,3 |
| 100 | 12 | 12 | 23 |

Per i trasmettitori specificati per una potenza massima di uscita non riportata sopra, la distanza di separazione raccomandata *d* in metri (m) può essere calcolata usando l'equazione applicabile alla frequenza del trasmettitore, ove *P* è la potenza massima nominale d'uscita del trasmettitore in Watt (W) secondo il costruttore del trasmettitore.

*For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.*

Note_s:

(3) A 80 MHz e 800 MHz, si applica l'intervallo della frequenza più alto.
*At 80 MHz and 800MHz, the separation distance for the higher frequency range applies.*

(4) Queste linee guida potrebbero non applicarsi in tutte le situazioni. La propagazione elettromagnetica è influenzata dall'assorbimento e dalla riflessione di strutture, oggetti e persone.
*These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.*